

USDA
NATURAL RESOURCES
CONSERVATION SERVICE

DELAWARE CONSERVATION
PRACTICE STANDARD

**IRRIGATION SYSTEM,
TAILWATER RECOVERY**

CODE 447
(Reported by No.)

DEFINITION

A planned irrigation system in which all facilities utilized for the collection, storage, and transportation of irrigation tailwater for reuse have been installed.

PURPOSES

This practice may be applied as part of a conservation management system to support one or more of the following:

- Conserve irrigation water supplies.
- Improve offsite water quality.

**CONDITIONS WHERE PRACTICE
APPLIES**

Tailwater recovery systems are suitable for use on lands and facilities that are served by a properly designed and installed irrigation system where recoverable irrigation runoff flows can be anticipated under current or expected management practices.

This standard applies to the planning and functional design of irrigation tailwater recovery systems including, but not limited to, pickup ditches, sumps, pits, and pipelines. It does not

apply to detailed design criteria or construction specifications for individual structures or components of the recovery system.

CONSIDERATIONS

Irrigation systems should be designed to limit tailwater volumes to that needed for effective operation. This reduces the need or minimizes the size and capacity of collection, storage, and transportation facilities. Changes in irrigation water management activities will be necessary to accommodate return flows.

Nutrient and pest management measures should be planned to limit chemical-laden tailwater as much as practical. Chemical-laden water can create a potential hazard to wildlife, especially waterfowl that are drawn to ponded water.

Protection of system components from storm events and excessive sedimentation should be considered.

Downstream flows or aquifer recharge volumes dependent on runoff will be reduced. Existing wetland hydrology could be impacted by this practice.

This practice has the potential to affect National Register listed cultural resources or eligible (significant) cultural resources. These may include archeological, historic, or traditional cultural properties. Care should be taken to avoid adverse impacts to these resources. Follow NRCS state policy for considering cultural resources during planning.

CRITERIA

**General Criteria Applicable To All
Purposes**

The installation and operation of a tailwater recovery system shall comply with all federal, state and local laws, rules and regulations.

Facilities needed for a tailwater recovery system shall be designed and constructed according to appropriate NRCS standards and specifications. The criteria for the design of components not addressed in a NRCS practice

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

standard shall be consistent with sound engineering principles.

Collection Facilities. Facilities for the collection of irrigation tailwater can be an integral part of irrigation systems covered by NRCS Conservation Practice Standards 443-Surface and Subsurface and 442-Sprinkler. These facilities may include, but are not limited to, ditches, culverts, pipelines, water control and/or grade stabilization structures or other erosion control measures, as needed.

Storage Facilities. Facilities are needed to store the collected water until it is redistributed in the irrigation system. Runoff volume and rate, as well as the required level of water control at the point where the tailwater is returned to the irrigation system, should be considered in determining the size of the storage facility.

For systems where tailwater is discharged into an irrigation pit or regulating reservoir or into a pipeline having facilities for regulating fluctuating flows (i.e. a float valve), small sumps with frequently cycling pumping plants may be used. For systems unable to regulate flows, tailwater sumps or pits shall be made large enough to provide the regulation needed to permit efficient use of the water.

When energy sources for tailwater pump back systems are subject to interruption, safe emergency bypass areas cannot be provided, or tailwater discharges violate local or state regulations, tailwater storage requirements shall, as a minimum, include a volume adequate to store the complete runoff from a single irrigation set.

Sumps and pits shall be equipped with inlets designed to protect the side slopes and the collection facilities from erosion. A dike, ditch, or water control structure shall be provided, if required by state law, to limit the entrance of rainfall runoff into the designed inlet. Sediment traps shall be installed as needed.

Conveyance Facilities. All tailwater recovery systems require facilities to convey water from the storage facility to a point of entry back into the irrigation system. These facilities may consist of a pumping plant and pipeline to return the water to the upper end of the field, or a gravity

outlet having a ditch or pipeline to convey the water to a lower elevation in the irrigation system. Other components or combinations of components may be necessary as determined on a site-specific basis.

The capacity of conveyance facilities shall be determined by an analysis of the expected runoff rate, the planned irrigation pit or regulating reservoir storage capacity, and the anticipated irrigation application. If the return flow is used as an independent irrigation supply rather than as a supplement to the primary irrigation water supply, the rate and volume of flow must be adequate for the method(s) of water application employed.

Additional Criteria Applicable To Improving Water Quality

Storage Facilities. Where additional storage is required to provide adequate retention time for the breakdown of chemicals in the runoff waters, storage facilities shall be sized accordingly. Allowable retention times shall be site specific to the particular chemical used.

Seepage from a storage facility shall be controlled to the extent possible when the storage facility is expected to receive chemical-laden waters. Control may be in the form of natural soil liners, soil additives, commercial liners, or other approved methods.

Where additional storage is required to provide for sediment deposition, storage facilities shall be sized accordingly. Allowable retention times shall be site specific to the particular soil type(s).

PLANS AND SPECIFICATIONS

Plans and specifications for irrigation tailwater recovery systems shall be prepared for specific field sites in accordance with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan specific to the facilities installed shall be prepared for use by the landowner or operator responsible for operation and maintenance. The plan should provide specific instructions for

operating and maintaining facilities to ensure they function properly. The plan shall include provisions to address the following, as a minimum:

1. Periodic cleaning and re-grading of collection facilities to maintain proper flow lines and functionality.
2. Periodic checks and removal of debris as necessary from trash racks and structures to assure proper operation.
3. Periodic removal of sediment from traps and/or storage facilities to maintain design capacity and efficiency.
4. Inspection or testing of all pipeline and pumping plant components and appurtenances, as applicable.
5. Routine maintenance of all mechanical components in accordance with the manufacturer's recommendations.

SUPPORTING DATA FOR DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

Planning Information, Field Data and Survey Notes

1. Field location of the tailwater recovery system. Also note the location of the practice on the conservation map.
2. Description of the objectives of the practice, including the desired functions which the tailwater recovery system is expected to provide.
3. Soils investigation logs and notes, as appropriate for site conditions and the proposed design.
4. Topographic survey of the site, as appropriate for site conditions and the proposed design.

Design Data

1. Location map with the site identified.
2. Soil survey map with the site identified.
3. Computations establishing the design capacity of the tailwater recovery system.
4. A set of plans and specifications for the components of the system, including the details of the sump/pit liner, if one is specified.
5. Plan and profile of sumps, pits and pipelines.

Construction Check Data/As Built Plans

1. Check notes recorded during and after completion of construction showing the as-built measurements of the practice.
2. Red line the construction plans to indicate the construction's conformance to the design.
3. Sign and date check-notes and plans by someone with appropriate approval authority. Include statement that practice meets or exceeds plans and NRSC practice standards.